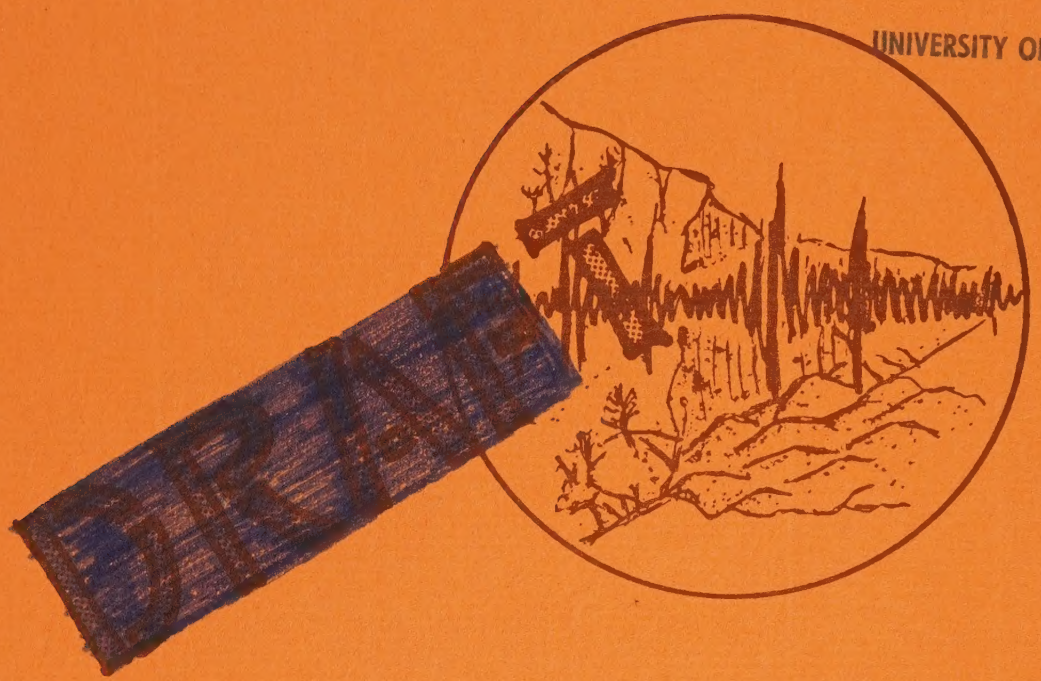
seismic safety element



general plan city of orange

RESOLUTION NO. 4739

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF ORANGE ADOPTING THE SEISMIC SAFETY ELEMENT AS PART OF THE GENERAL PLAN FOR THE CITY OF ORANGE.

WHEREAS, Section 65302f of the California Government Code requires a Seismic Safety Element as part of the comprehensive General Plan for any California city; and

WHEREAS, said Element shall consist of an identification and appraisal of seismic hazards such as susceptibility to surface ruptures from faulting, to ground shaking, to ground failure, or to effects of seismically induced waves such as tsunamis and seiches; and

WHEREAS, the Seismic Safety Element shall also include an appraisal of mudslides, landslides, and slope stability as necessary geologic hazards that must be considered simultaneously with other hazards such as possible surface rupture from faulting, ground shaking, ground failure and seismically induced waves; and

WHEREAS, the Element was prepared with the assistance of and review by other departments; planning agencies; officials; public utilities; civic, educational, professional and other organizations; and citizens, to ensure maximum coordination; and

WHEREAS, the Seismic Safety Element was prepared in compliance with State law and fulfills the requirements of Section 65320(f) of the State Government Code, and can be used as a guide for future plans and programs in the City of Orange; and

WHEREAS, the work on the Seismic Safety Element has been divided into two parts, the first part is the actual Element, the second part is the technical report which provides more detailed discussions and the data base in support of the Element itself; and

WHEREAS, the City of Orange is, seismically speaking, in a fortunate position since the potential hazards identified in this Element, such as ground shaking, ground failure, seiches and expansive soils can be controlled once they are identified and prudently prepared engineering and construction plans can mitigate potential hazards and reduce or eliminate the possible risk involved; and

WHEREAS, the City Council has accepted the findings of the Environmental Review Board to prepare Negative Declaration 403.

NOW, THEREFORE, BE IT RESOLVED that the City Council of the City of Orange adopt the Seismic Safety Element as part of the Comprehensive General Plan for the City of Orange, and hereby instructs the staff to execute implementation measures outlined in the Element.

ADOPTED this 28th day of February, 1978.

ROBERT D. HOYT
MAYOR OF THE CITY OF ORANGE

ATTEST:

CHARLOTTE M. JOHNSTON, CMC
CITY CLERK OF THE CITY OF ORANGE

I hereby certify that the foregoing resolution was duly and regularly adopted by the City Council of the City of Orange at a regular meeting thereof held on the 28th day of February, 1978, by the following vote:

AYES: COUNCILMEN: BARRERA, SMITH, HOYT, BEAM

NOES: COUNCILMEN: NONE
ABSTAINED: COUNCILMAN : PEREZ
ABSENT: COUNCILMEN: NONE

CHARLOTTE M. JOHNSTON, CMC
CITY CLERK OF THE CITY OF ORANGE

STATE OF CALIFORNIA)
COUNTY OF ORANGE) ss.
CITY OF ORANGE)

I, CHARLOTTE M. JOHNSTON, CMC, City Clerk of the City of Orange, California, DO HEREBY CERTIFY that the foregoing Resolution No. 4739 is a true and correct copy of the original as appears on record in this office.

WITNESS my hand and seal this 26th day of July, 19 78.

(SEAL)

Charlotte M. Johnston, CMC
City Clerk of the City of Orange

DRAFT

SEISMIC SAFETY ELEMENT

CITY OF ORANGE

CITY COUNCIL

Robert D. Hoyt, Mayor
Don E. Smith, Mayor Pro-tem
Fred Barrera
James Beam
Jess Perez

CITY MANAGER

Gifford W. Miller

PLANNING COMMISSION

Don Ault, Chairman
Carmine Master
Joanne Coontz
Dave Hart
Robert Mickelson

PLANNING & DEVELOPMENT SERVICES

Bert K. Yamasaki, Director

TABLE OF CONTENTS

DRAFT

EXHIBITS

A complete set of maps appear in the technical report.

INTRODUCTION

The Seismic Safety Element is a mandatory component of the General Plan. Guidelines prepared by the California State Council on Intergovernmental Relations (CIR) recommend the identification and appraisal of seismic hazards such as susceptibility to surface rupture from faulting, to ground shaking, to ground failures, and to the effects of seismically induced waves such as tsunami and seiches. In addition, the guidelines suggest that related geologic hazards be considered in the process of developing the Element.

The purpose of the Seismic Safety Element is to:

1. Provide information that can be used to maximize the protection of life and property.

2. Identify potential seismic and seismic related occurrences in the Orange area and their impacts on the City of Orange.

3. To provide information that will aid in disaster planning as related to seismic occurrences.

Since the very nature of a seismic disaster is not a localized problem, a large portion of the Element is based on countywide information which is subsequently applied to the City of Orange.

This Element contains an identification of the opportunities and issues, defines and analyzes the concept of risk, examines certain seismic and related hazards, and sets forth a basic framework of goals, policies and implementation methods.

This Element is supported by a Technical Report which has been prepared so that a more detailed discussion of the technical data and terms would be possible. The Technical Report is published under separate cover, and while not a part of the Seismic Safety Element of the City of Orange General Plan, is the main source of technical information on which the Element is founded. Where relevant, the technical document has been referenced in the Element.

OPPORTUNITIES AND ISSUES

In the 50 states, based on past data, 1500 persons will lose their lives in a 2-year period as a direct result of earthquakes. In fact, those persons living in the SCAG region can expect to feel three moderate earthquakes during their lifetime.[1]

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1 Summary of proceedings for the Seismic Public Element Seminar - SCAG - April 10, 1974, Dr. James Slosson

It is a well-known fact that California is situated in a seismically active region of the globe, and is laced with earthquake faults that spread over much of the state, including some of its most important urban areas. Consequently, virtually all of California is subject to earthquake shaking and future earthquakes which are capable of producing great damage and disaster.[2] The impact of not adequately planning, building and preparing for the effects of an earthquake can be seen by the effects of the February 9, 1971 San Fernando Earthquake. As a direct result of that earthquake, requirements were enacted by the California State Legislature which placed specific responsibilities on local government for identification and evaluation of seismic hazards. The basic objective of that legislation was to reduce the loss of life and property as a result of natural disasters related to earthquakes. Specific authority is derived from Government Code Section 65302 (f) which requires a Seismic Safety Element of all City and County general plans, as follows:

> A Seismic Safety Element consisting of an identification and appraisal of seismic hazards such as susceptibility to surface ruptures from faulting, to ground shaking, to ground failures, or to the effects of seismically induced waves such as tsunamis and seiches.
>
> The Seismic Safety Element shall also include an appraisal of mudslides, landslides, and slope stability as necessary geological hazards that must be considered simultaneously with other hazards, such as possible surface ruptures from faulting, ground shaking, ground failure, and seismically induced waves.[3]

The relative newness and low density form of the City of Orange's urban area are definite assets when evaluated in terms of overall safety and susceptibility to hazards. This is as opposed to the older, more congested urban areas built throughout Southern California, which were built without benefit of the post 1933 requirements. This creates an opportunity for the City of Orange not enjoyed by the majority of the more highly urbanized communities in California.

For the purpose of this Seismic Safety Element, two major areas of concern were identified: (1) protection of existing population and development, and (2) management of future development, including both urban expansion and intensification of present development. (See Technical Document).

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2 Meeting the Earthquake Challenge, part one - A Comprehensive Approach to Seismic Safety, page 5.

3 California Council on Intergovernmental Relation, General Plan Guidelines, Sept. 1973, P.IV-23.

GOALS AND POLICIES

Seismic Safety Element goals reflect broad aims and basic values within the City of Orange and provide guides to establish the emphasis and tone of proposed actions.

Seismic Safety Element policies are intended to develop a framework for evaluation of decisions regarding specific courses or methods of action.

Seismic and Geological Hazards

Goals:

- To provide a safe living environment consistent with available resources required to identify and control natural seismic and geological hazards.

- To mitigate potential disaster through land use and development standards designed to respect the tremendous forces of nature.

- To provide information, training and disaster assistance for those times when nature foils our best efforts to control its destructive forces.

Policies:

- Identify hazard areas and provide information to determine the relative risk to people and property in the community of Orange.

  . Map existing faults, slide areas and other geologically unstable conditions.

  . Analyze existing seismic and geological data as it pertains to this community.

  . Establish development standards for land use and construction to ensure proper design and location of structures.

- Create an on-going mechanism for developing and instituting controls to mitigate unacceptable risks.

  . Establish design criteria for proposed improvements to existing construction or new construction within seismic safety zones.

  . Establish seismic design criteria and standards for city linear system facilities, e.g., transmission lines, water and sewage systems, and highways.

  . Provide coordination to all agencies, within the County to assist in the mitigation of geologic and seismic hazards.

- Actively promote public awareness programs and monitor the effectiveness of controls and their implementation.

  . Provide technical and policy information regarding geological and seismic hazards to developers, interested parties, and the general public.

  . Disseminate information regarding hazards and mitigating measures through all available media.

- Support programs to investigate and understand the phenomena creating the hazard, train personnel in the effective technique of prevention and disaster control, and provide aid to persons affected by disasters.

  . Monitor and evaluate studies of earthquake damage to determine future regulations and programs.

  . Provide guidance during and after a geologic disaster and promote interagency assistance for persons affected.

  . Provide safe housing facilities for dependent populations (e.g., those in convalescent and nursing homes, correctional institutions, hospitals, sanitariums and private schools), by requiring special seismic design standards and construction criteria.

Flood Hazards

Goals:

- To provide a safe living environment consistent with available resources required to identify and control natural water related hazards.

Policies:

- Identify hazard areas and provide information to determine the relative risk to people and property in the City of Orange.

  . Identify by mapping flood-prone areas with respect to depth and frequency of flooding.

  . Establish development standard for land uses and construction to ensure proper design and location of public and private structures.

- Actively promote public awareness programs and monitor effectiveness of controls and their implementation.

  . Provide technical and policy information regarding flood hazards to developers, interested parties and the general public.

  . Disseminate information regarding hazards and mitigating measures through all available media.

- Support programs to investigate and understand the phenomena creating the hazard, train personnel in the effective technique of prevention and disaster control, and provide aid to persons affected by disasters.

  . Monitor and evaluate studies of the use of non-structural alternatives, including more compatible land use planning adjacent to watercourses, for flood control purposes.

  . Provide guidance during and after flood disaster and promote inter-agency assistance for persons affected.

DISCUSSION OF THE CONCEPT OF RISKS

The State Guidelines for developing a Seismic Safety Element have introduced the concept of "acceptable risk", and suggested that it be used as a guide for formulating plan policies and programs. Specifically, the Guidelines suggest that a policy statement be included in the Element which specifies the level or nature of acceptable risk to life and property. It is further recommended that land use standards be developed which reflect an acceptable level of earthquake hazard or risk. As the state suggests, risk factors should undoubtedly have a significant role in the formulation of policy pertaining to public health, safety, and welfare. However, it is questionable whether a public body can define and articulate a level of risk that will be acceptable to the entire community at large over any extended period of time.

An alternative approach has been alluded to by the State Joint Committee on Seismic Safety. This approach is set forth in a recent publication entitled, "Meeting the Earthquake Challenge." Essentially, the Committee maintains that:

1. There is no uniform level of risk that is acceptable to the public.

2. Maximum safety is desirable.

3. Demands for increased safety must be related to costs.

4. Such demands vary with time, place, culture and a variety of other factors.

5. Society is capable of undertaking additional risk reduction measures.

The basic assumptions of the Joint Committee seem to imply that there can be no meaningful answer to the question of "how safe is safe enough?"

Following the reasoning of the Committee it does not seem that if [illegible] constraints (i.e. lack of knowledge, limited resources, conflicting priorities) limit efforts to reduce risk, the remaining degree of risk should become "acceptable".

Since the risk clearly must be tolerated while not necessarily being "acceptable", the following definitions are offered to clarify the City's approach to the question of risk:

Tolerated Risk:

Perceivable risks to life and property that are not currently being reduced due to technological limitations, limited resources, or conflicting priorities. This definition assigns no characteristics to the nature of such risk and is designed solely to address its status in relationship to current reduction capabilities.

Unacceptable Risk:

Perceivable risks to life and property that must be reduced through ongoing government action programs.

Standards for Defining Unacceptable Risk

The proposed approach, stressing the identification of unacceptable risks, is not new. Government codes and ordinances dealing with public health, safety and welfare have evolved over the years through just such a process. In its current form, this body of law represents a statement of those risks currently deemed unacceptable. It does not attempt to establish "how safe is safe enough?" It simply identifies conditions that are considered unsafe. This is a position the City of Orange has already taken by such actions as the adoption of the 1973 Uniform Building Code.

SEISMIC SAFETY HAZARDS

GENERAL TOPOGRAPHY

Orange County, situated on the California south coastal plain, covers an area of 782 square miles. It is bounded by Los Angeles and San Bernardino Counties to the north, Riverside County to the east, San Diego County to the south, and the Pacific Ocean to the west. Folding and faulting of the earth's crust during the Tertiary Period produced the topographic features visible today. The western portion of the County is a series of broad sloping plains (Downey and Tustin Plains) formed from alluvium transported from the mountains by the Santa Ana River, Santiago Creek and other local streams. The Puente-Chino Hills which identify the northern limit of the valley, extend for 22 miles and reach a peak height of 1780 feet. To the east and southeast of the valley are the Santa Ana Mountains, which have a peak height of 5691 feet. North of the City of Orange are the Peralta Hills, exceeding a height of 1500 feet. To the south is the Lomas de Santiago ridgeline with elevations as high as 1770 feet.

The City of Orange is located in the low foothills on the west flank of the Santa Ana Mountains, and east of the Santa Ana River. Within its boundaries run portions of the Santiago Creek. The majority of this community is located on older sedimentary rock overlaid with alluvial material deposited by the Santa Ana River and Santiago Creek. The eastern portion of

the community, in particular the El Modena Hills, consist of volcanic rock deposited in the late Miocene time.[4] The City of Orange is slightly more than nineteen (19) square miles. The planning area for this community encompasses about twice that area, or approximately thirty-eight (38) square miles.

The El Modena fault is the only named fault which exists with the City's planning area; however, several faults are located within close proximity and their displacement could possibly be felt in the City of Orange. (See Maps G & I). These faults are:

Fault	Approximate Distance from Orange
Whittier	8.5 miles NE
Newport Inglewood	14 miles SE
San Jacinto	34 miles NE
San Andreas	38 miles NW
San Fernando	52 miles NW

POTENTIAL HAZARDS

Earthquakes commonly give rise to various geologic processes that may cause severe damage to structures and harm to people in them. These processes include such things as surface faulting, ground failure, subsidence, landslide and seiches.

These hazards vary widely from area to area, and the level of hazard depends on geologic conditions as well as the extent and type of land use.

The City of Orange is relatively fortunate that it does not presently have within its boundaries a special studies zone as defined by the Alquist-Priolo Special Studies Zones Act of 1972. The purpose of this Act, which went into effect March 7, 1973, is to provide for public safety in hazardous fault zones. It requires local governments to withhold approval of construction permits in those special zones until geologic investigation has determined, using the available evidence and up-to-date methods, that the site is not threatened by surface displacement from future faulting. The Act further provides that there be a continuous review of new geologic and seismic data in order to revise the special studies zones or delineate additional zones.

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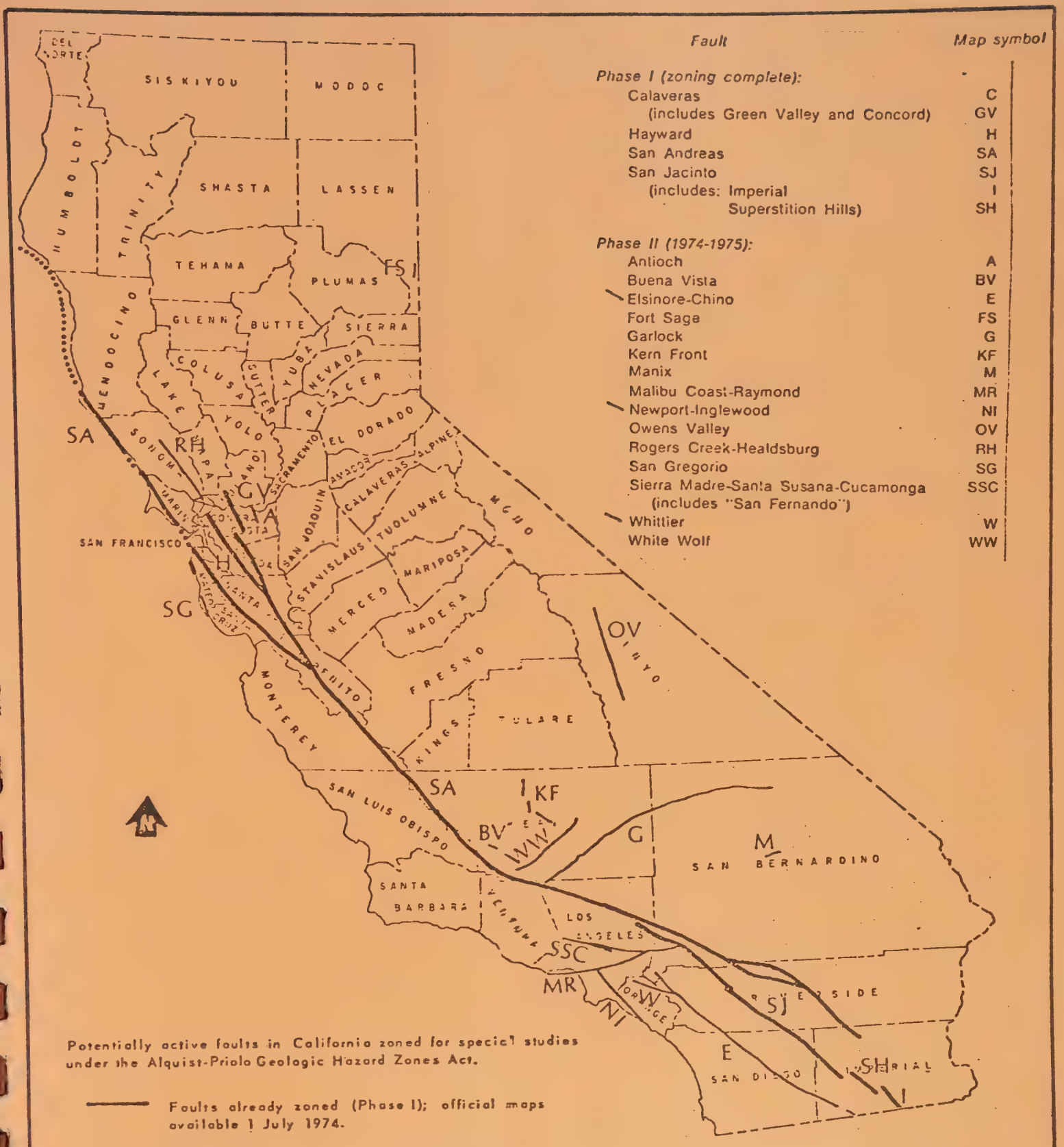
4 Volcanic Rocks of the El Modena Area, Orange County, California Geological Survey Professional Paper 274-L, page 313.



fault zones in california

map G

legend

Fault lines are shown solid where well located, dashed where approximate and dotted where concealed. Line widths do not infer width of faults.

Active during Pleistocene geologic time (from 11,000 years to 3,000,000 years before present). Not known to have been active in Holocene time.

Not known to have been active since 3,000,000 years before present.

4.0
6-17-47 Epicenter of magnitude 4 through 4.9 Magnitude and date of event are listed.

Epicenter of magnitude 1 through 3.9

2X Figures indicate the number of earthquakes at the same place, all equal to or smaller than the one plotted.

Epicenters are plotted for period 1934 - 1972

Source ; Fault Activity and Earthquake Epicenter Map of Orange County

by Paul K. Morton 1973

seismic faults

0 1000 2000 3000

seis map 1

department of planning and development services

Due to the distance of this community from known fault zones such as the Whittier-Elsinore, Newport-Inglewood and the San Andreas, the greatest potential damage will come from ground shaking, not rupturing.

The following is a brief discussion of those hazards which could directly impact this community. A more detailed discussion of this appears in the technical report.

Faults

The only named seismic fault in this community is the El Modena fault. It is a smaller north-northwest trending fault located in the west flank of the Santa Ana Mountains about two miles northeast of the El Modena Community. The El Modena fault has evidence of quaternary displacement exposed at several sand and gravel extraction sites. It is not established as notoriously active, certainly not by surficial geologic affects; in fact, the published record is somewhat weak as to the position and continuity of the fault.

Little, if any, impact is seen as likely from this fault but it should be considered when evaluating new development in the general area.

Ground Shaking

Past experience and data has shown that the intensity and severity of ground shaking is effected by the depth of the bedrock beneath any given building and the distance from the fault. A high rise building and a two-story wood structure would react differently to the same quake if located in exactly the same spot.

In the event of an earthquake, the greatest existing hazard within the City is the continued existence and use of older structures incapable of withstanding earthquake forces. The City of Orange is in the fortunate position that its older structures are non-critical facilities having a relatively low profile, thereby reducing the probability of damage to life and property. Though much remains to be learned, knowledge of earthquake-resistant design and construction has increased greatly in recent years. As this knowledge increases, the City of Orange will undoubtedly take full advantage. To determine, however, the existing impact of ground shaking on existing structures would require extensive study of soil condition, time and type of construction; location of area in relation to major faults, historic seismicity and strong motion records.

Ground Failure

Of the varying types of ground failure possible the City of Orange can expect landslides and subsidence to have the greatest potential effect.

Landslides

Map K shows areas of known major landslides and areas of thirty percent slope or more which are known to be geologically unstable. These known landslides concentrate along the steeper slopes north and east of the Santiago Creek.

Grading can promote the instability of both old landslide areas which have reached equilibrium, and of naturally stable areas. Settlement results wherever slopes or areas with perched water tables are overloaded, and lateral instability (landsliding) results wherever support of bedding planes and other natural discontinuities in the earth materials are removed by excavation.

As shown by the San Fernando earthquake, graded areas can suffer extensive damage where seismic parameters have not been taken into account, as is common where residences bridge both cuts and fills; and lowland areas upgraded and underlain by floodplain sediments can suffer similar damage because of the greater response of these soils to earthquake shaking.

Graded instability becomes an important part of detailed site-by-site or tract-by-tract investigations. These problems can be either avoided, corrected or minimized by proper geologic-soils attention prior to design and grading.

Subsidence

As shown on Map L an area of ground subsidence of 0.01 to 0.02 feet, occurring between the years 1956 and 1961, is present in the southwestern part of the planning area. This is the northern edge of an area of subsidence, with a maximum of 0.4 feet, centered approximately two miles north of Santa Ana. Subsidence is likely to be related to ground-water withdrawal.[5]

Seiche & Flooding

Seiche are earthquake-generated waves within enclosed or restricted bodies of water (lakes, reservoirs and bays). Within the planning boundaries of Orange there are two dams: 1) - Villa Park Dam, owned by the Orange County Flood Control District, and 2) - Santiago Creek Dam, owned by the Serrano Carp Irrigation District. Four reservoirs exist in this area which are not owned by the City of Orange: 1) - Peters Canyon Reservoir, owned by the Irvine Company, 2) - Olive Hills Reservoir, 3) - Walnut Canyon Reservoir and 4) - a small reservoir by the Nohl Ranch Road, all owned by the City of Anaheim. The City of Orange owns and operates eight (8) water storage reservoirs and three (3) forbeay (where the water is aerated.) (See Map C) Although not in the County of Orange, Prado Dam, located in Riverside County and owned by the Corps of Engineers, should be mentioned since it feeds into the Santa Ana River. The potential for dam failure during a Seismic event presents two major problems. First and foremost, the threat

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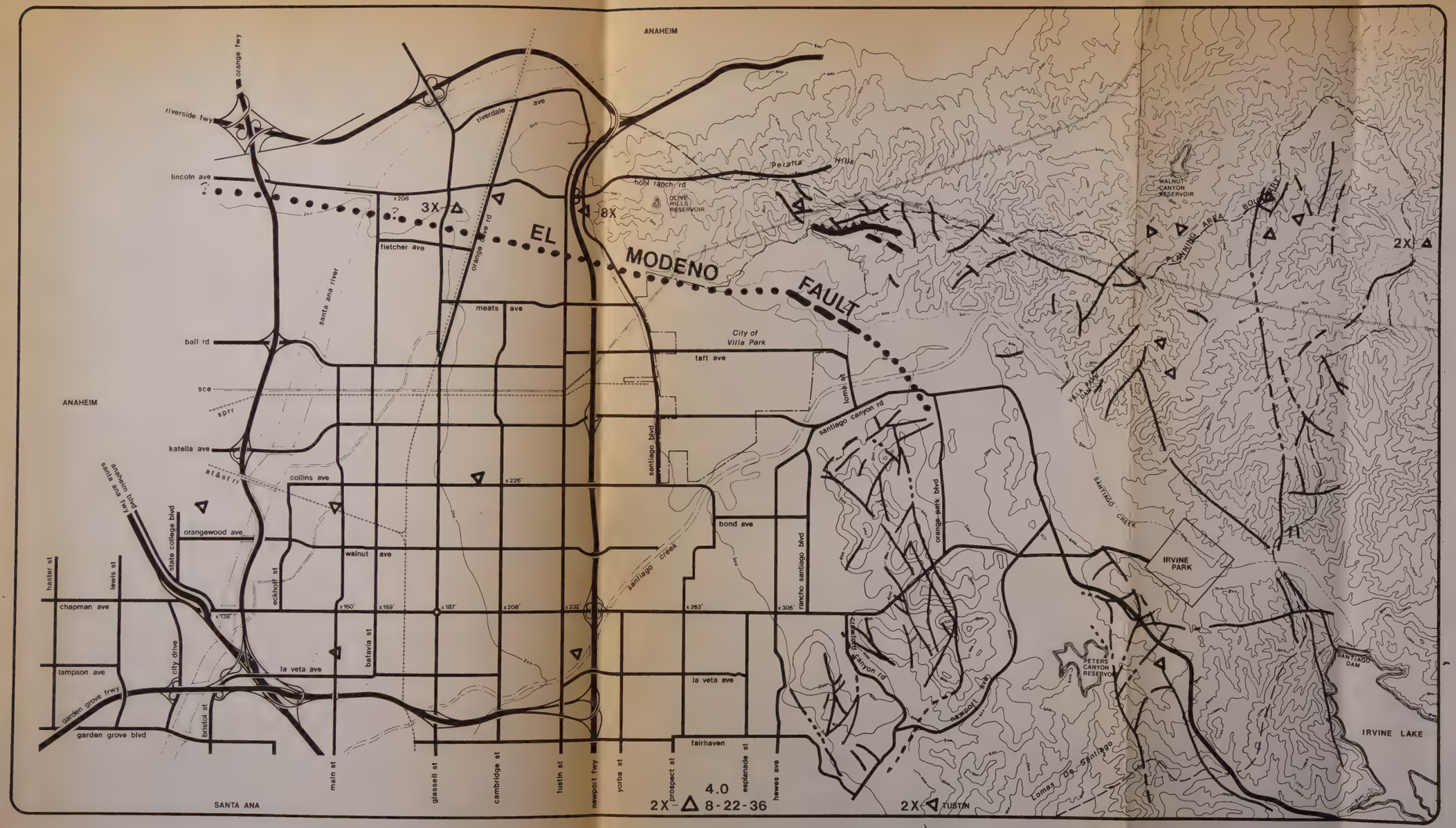
5 Preliminary Review of Geologic-Soils Conditions in Area of the General Plan - City of Orange - 4/10/71 - F. Beach Leighton and Associates.



city of orange general plan

seismic safety element

legend

Fault lines are shown solid where well located, dashed where approximate and dotted where concealed. Line widths do not infer width of faults.

Active during Pleistocene geologic time (from 11,000 years to 3,000,000 years before present). Not known to have been active in Holocene time.

Not known to have been active since 3,000,000 years before present.

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2X — Figures indicate the number of earthquakes at the same place, all equal to or smaller than the one plotted.

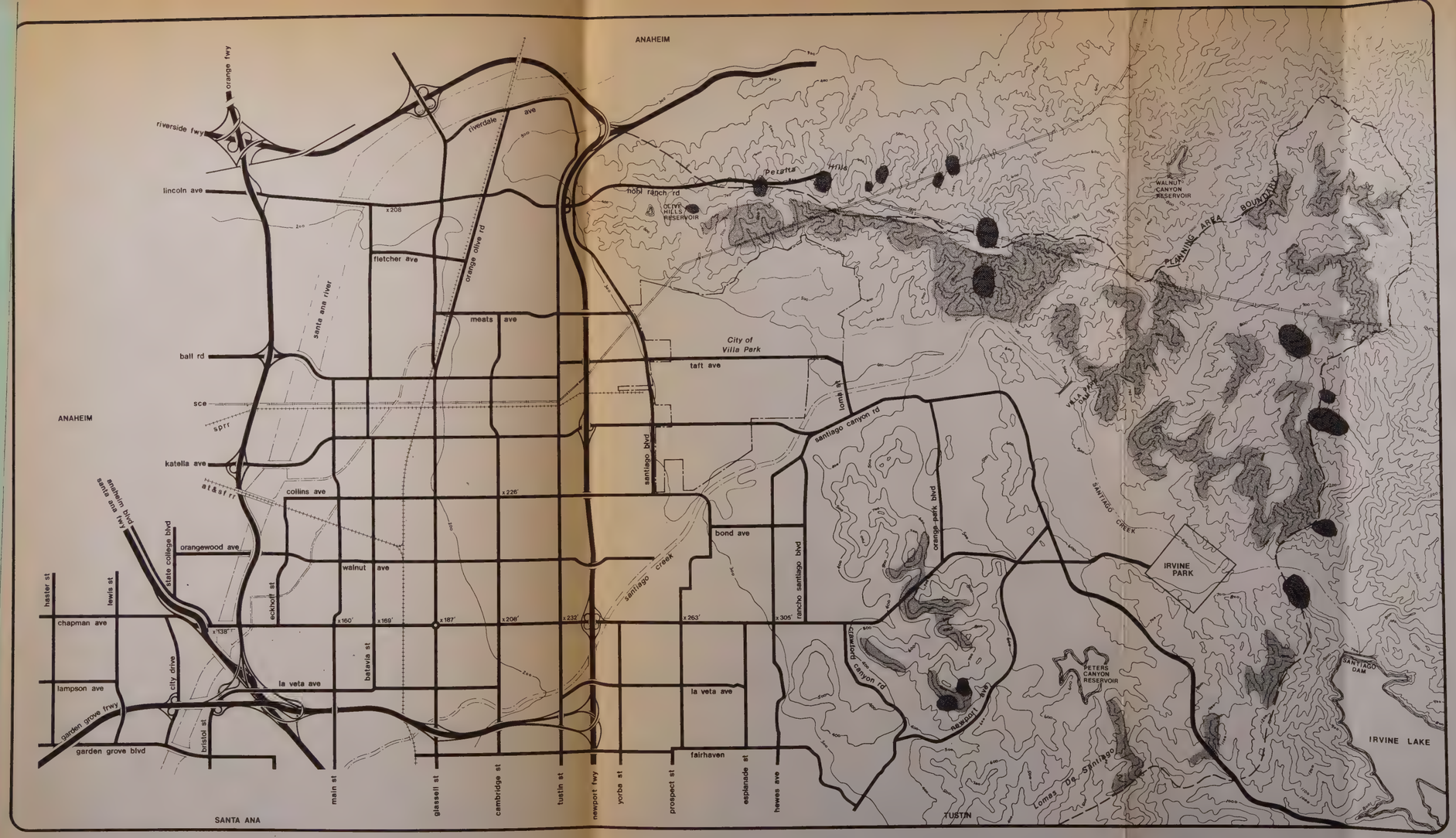
Epicenters are plotted for period 1934 - 1972

Source ; Fault Activity and Earthquake Epicenter Map of Orange County by Paul K. Morton 1973

seismic faults

map 1

department of planning and development services



city of orange general plan

seismic safety element

legend

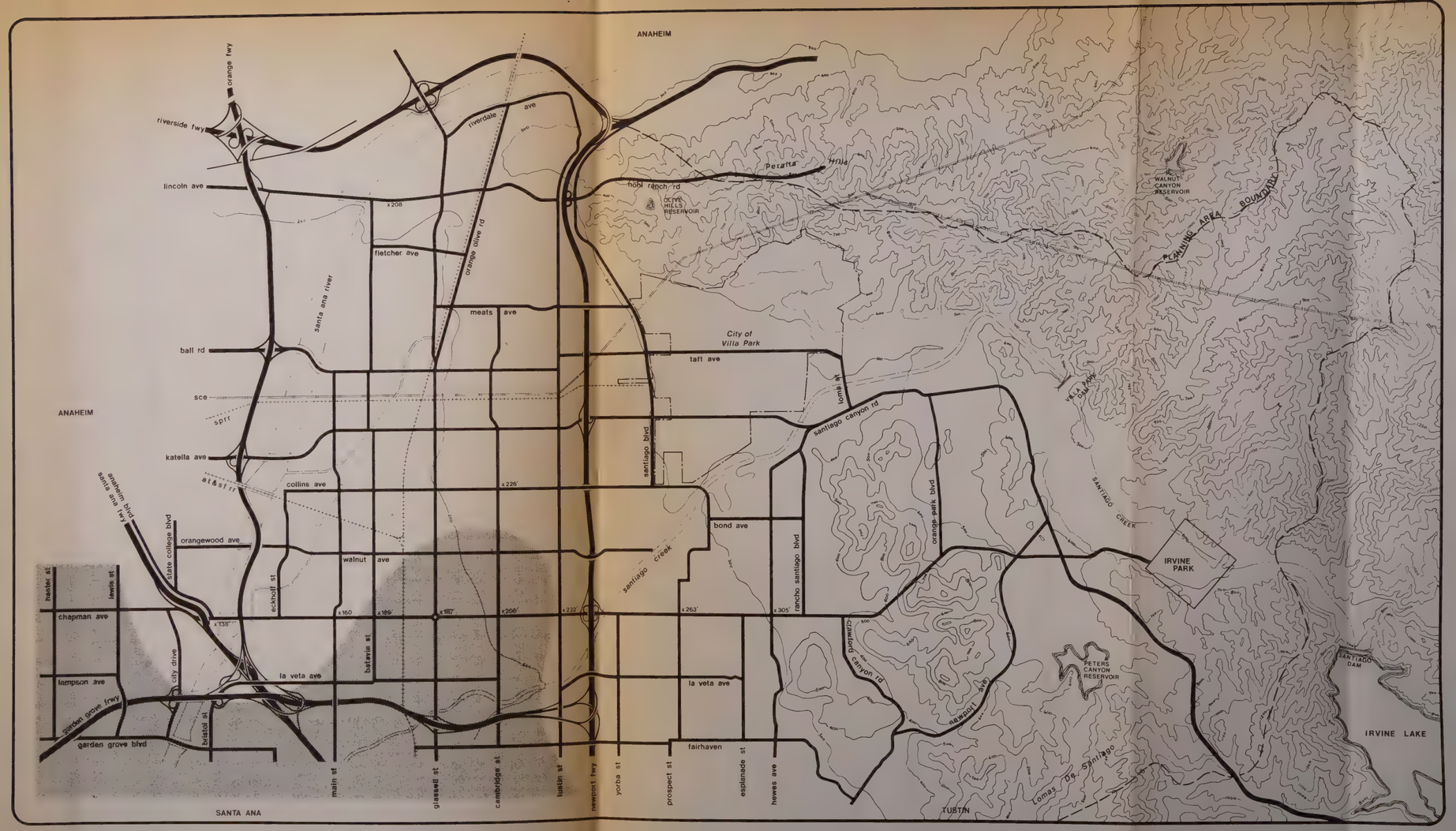
known landslides

30% and above slope areas & known geologic instability

landslides slope areas

map K

department of planning and development services



city of orange general plan

seismic safety element

legend

ground subsidence area

subsidence area

map L

department of planning and development services

city of orange general plan

seismic safety element

legend

- ● enclosed reservoir
- ○ open reservoir
- ★ flood control
- ☆ recreational lake

water facilities

map C

department of planning and development services

city of orange general plan

seismic safety element

legend

- sediments of the santa ana river flood plain
- sediments of the santiago creek flood plain
- drainage channel
- bedrock areas

expansive soils

map M

department of planning and development services

to life and property must be considered. The second major problem concerns loss of function. The City of Orange is heavily dependent on dams and reservoirs for storage of its water supply. Loss of this function would most certainly result in local water shortages. Flood control is another vital function of dams. Without the protection afforded by such facilities, many areas of the City would be subject to seasonal damage from flooding. The protection of property downstream from a dam or water supply reservoir is probably not possible in the case of failure. However, with the use of inundation maps prepared for all dams, the City of Orange has prepared emergency measures and procedures (Emergency Plan-City of Orange, dated September 1, 1973) to minimize potential problems.

Expansive Soils

Three major types of earth materials are present within the planning area boundary, exclusive of the most recent drainage channels which are not buildable: (Map M)

1. Sediments of the Santa Ana River Floodplain. These materials have been derived principally from igneous and metamorphic rocks upstream, and are expected to be non-expansive to moderately expansive.

2. Sediments of the Santiago Creek Floodplain. These materials have been derived from an area dominated by sedimentary rocks, and are expected to be moderately to highly expansive.

3. Bedrock Area. The hilly eastern part of the planning area is dominated by bedrock composed principally of sedimentary rocks with lesser amounts of volcanic rocks. Top soils formed on or from these rocks will vary widely in expansiveness depending on the type of parent rock, but are expected to be highly expansive on and near the finer-grained siltstones and claystones.[6]

Expansive soil conditions present in the soils of this community will require specialized grading techniques or foundation treatment to control uplift characteristics of these materials. Settlement due to structural loading within areas underlain by compressible materials, such as thick topsoil, alluvium and/or terrace deposits is a potential problem within the lower elevations of the community.

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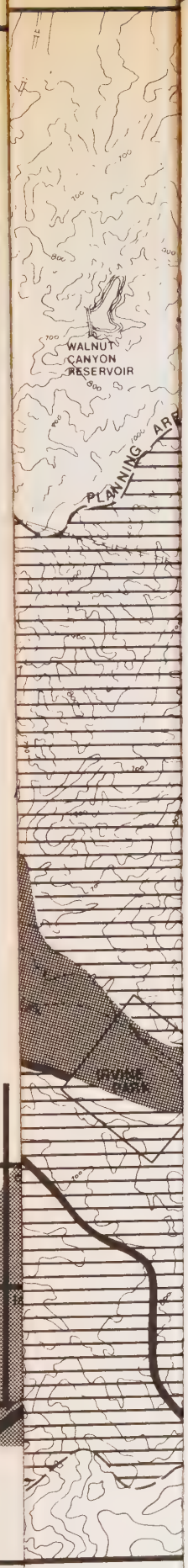
6 Preliminary Review of Geologic-Soils Conditions in Area of the General Plan - City of Orange - 4/10/71 - Beach Leighton and Associates.



legend

sediments of the santa ana river flood plain

sediments of the santiago creek flood plain

drainage channel

bedrock areas

expansive soils

0 1000 2000 3000

seis

map M

department of planning and development services

PLAN IMPLEMENTATION PROGRAM

The implementation program of any plan is vital to accomplishing the primary goals and policies as identified in that plan. The following is an integrated set of recommended actions relating to existing programs, major land use concerns, and specific land-use planning and development controls.

Existing Programs:

The following programs have actual or potential application to the problems identified in this Element:

City:

- zoning regulations
- building regulations
- disaster response coordination
- emergency medical aid
- fire protection
- land division regulations
- general plan and supporting elements

County:

- Orange County Safety Element
- building regulations
- disaster response coordination emergency medical aid
- fire protection
- land division regulations
- relocation services
- taxation
- zoning regulations
- cooperative mapping program with California Division of Mines & Geology and U.S. Geological Survey

State:

- dam inundation areas mapping and evacuation plans
- dam safety inspection
- active fault mapping (Alquist-Priolo Hazards Zone Act)
- geologic research and mapping
- school safety

Federal & Other

- relocation services
- taxation
- U.S. Geological Survey Mapping and Earthquake Research and Monitoring
- Department of Housing and Urban Development - Urban Planning Research Funding
- University Research on Geologic Hazards

Hazard Reduction Strategies:

Methods of mitigating geologic hazards most often employed fall into three basic categories, as follows:

Hazard Abatement:

This is the most positive means of hazard reduction but also is the most controversial since it primarily involves the elimination of an existing hazard, usually at a substantial cost to the owner. Demolition of an old, earthquake-vulnerable building is an example. It can also have significant negative social impact related to possible relocation requirements of the abatement.

Impact Reduction:

This strategy addresses measures to minimize the adverse effects of future earthquakes and geologic events on existing and future developments. It can involve reactive efforts such as emergency or contingency plans after a disaster; or standards up-grading to minimize possible adverse effects.

Hazard Avoidance:

Most important at the land-use planning level is the strategy of avoidance. With the advanced knowledge of the various types and severity of hazard within a planning area, those land uses most compatible with the risk can be matched, thereby avoiding unacceptable risk areas or limiting them to the least important uses.

Setting Priorities:

The following criteria should be used to establish priorities so that judgments can be made regarding allocation of limited funds to the most critical areas or problems:

Recognize the risk perception which has been established by the community.

Determine the potential severity of losses to life and injury; property damage and loss of function, caused by an earthquake or related hazard.

Establish the probability of future seismic activity and the general susceptibility of the population and man made structures in this community.

Implementation Measures:

1. Earthquake-Hazardous Old Buildings:

Action should be taken to identify all such structures in the city and to abate the hazard, either by condemnation and removal or by repair and improvement to acceptable safety levels. This would first involve establishing criteria for identifying and evaluating existing structural hazards as discussed in the County of Orange Safety Element-Technical Report.

If a building survey reveals existence of significant risk from falling structural elements such as parapets, canopies, unreinforced walls or chimneys, adoption of an appropriate ordinance should be considered to eliminate such hazards or to require the necessary corrective work be done.

2. Survey of Existing Important Structures:

A comprehensive survey should also be made of fire stations and all older public or private buildings that are essential to relief and emergency operations after a disaster, to determine if remedial measures are required to assure their continued functioning following a strong earthquake. Although individual sites or facilities were not specifically evaluated for this study, further investigation regarding their compliance with current structural standards for a seismic design should be considered in order to verify their apparent safety.

3. Geotechnical Investigation Requirements for Construction of Important Structures:

Detailed geologic/seismic and soil engineering reports not presently required by the City Building Code should be required for the following types of facilities in all seismic zones:

Facilities Vital in Emergencies

Hospitals and other medical facilities having surgery or other emergency treatment areas.

Fire and police stations.

Municipal government disaster operation centers.

Municipal government and other communications centers deemed to be vital in erergencies.

The foregoing are considered buildings or structures which must be safe and usable for emergency purposes after an earthquake in order to preserve the peace, health and safety of the general public, and therefore deserve greater care in site evaluation and more conservative design than for ordinary construction.

Also recommended for consideration are the following types of facilities which should be included in the group requiring detailed reports and special design considerations.

Other Important Structures:

Critical-use facilities; power intertie systems, linear and other major intra-structure systems, plants manufacturing explosives, toxic or highly flammable products.

High-occupancy facilities; any building having building occupancy levels that are considered critical from a seismic safety standpoint. A suggested occupancy level in excess of 400,000 man-hours per year is suggested as a criterion.

4. Seismic Design Considerations for New Construction:

Conformance with the 1973 Uniform Building Code is considered adequate for most ordinary types of construction. At the discretion of the Building Official, certain of the more important, vital or critical-use structures (discussed above), should be specified as requiring the more conservative seismic design parameters based on the maximum credible earthquake rather than the maximum probable earthquake. Other, less important uses, such as certain utilities and roads, could be designed based on the maximum probable earthquake, as are the ordinary types of construction.

5. Fault and Other Seismic Hazards Related to New Construction:

With regard to landslides, expansive soils and subsidence, specific analysis of the hazards appears warranted for residential tract development and important or critical use structures located in potentially hazardous areas. It is recommended that the new grading ordinance be adopted as soon as possible.

6. High-Rise Structures:

The seismic problems related to high-rise structures are primarily evacuation procedures and fire control. Continued review and improvement of these procedures is essential to reduce loss of life and injury.

7. Dam, Reservoir and Water Tank Reservoirs:

Although several such facilities are beyond the jurisdictional control of the City of Orange, evacuation plans should be part of this community's emergency response programs. Continued attention must be given to the placement construction and emergency plans for those facilities controlled by this community to reduce the threat of loss of life, property damage and loss of function.

8. Schools:

The 1933 Field Act established minimum earthquake safety standards for school construction. Legislation passed in 1968 and recently modified prohibits the use of seismically hazardous school facilities after 1977. The City of Orange is in the fortunate position that it already meets the requirements of this legislation. Any proposed new school construction may require special geologic-seismic and soil engineering investigation of the site to evaluate the geotechnical hazard, as provided for under the State Education Code.

9. Evaluation of Industrial Facilities Susceptible to Seismically Caused Accidents:

If determined necessary, the City should adopt an ordinance defining hazardous industries or types of facilities susceptible to potentially serious accidents resulting from seismic activity. Appropriate authority to inspect such facilities and to enforce any adopted regulations or standards should also be enacted. It may be necessary in the future to obtain authorization to provide staff and funding necessary to enable the appropriate city agency to conduct a survey to evaluate potential hazards and to recommend guidelines or procedures for safe handling, processing, manufacture or storage of dangerous materials.

10. Disaster Planning:

The City of Orange has developed an Emergency Operation Plan. Continued review, revision and improvement of this plan is recommended to insure the preparedness of this community in the event of a seismic hazard.

11. Public Awareness:

Although the public school system attempts to educate its students as to methods of reducing loss of life and injury in the event of a seismic disaster, the general public is usually less than informed on this subject. An active education program should be developed and implemented to advise the citizens of this community on ways to reduce the threat of loss of life, injury and damage to property due to seismic disaster.

12. Review and Rivision:

The City should review the Seismic Safety Element at least every two years in order to incorporate the results of new knowledge, to revise and improve existing provisions, and to eliminate provisions that may to outdated.

RELATIONSHIP TO GENERAL PLAN ELEMENTS

Land Use Element

The Seismic Safety Element has a stronger interface with the Land Use Element than with any other element of the City of Orange General Plan. Policies of the Seismic Safety Element will provide for additional guidance in directing land use away from designated hazardous zones, or providing effective mitigating measures.

Significant portions of the Land Use Element may require re-evaluation and amendment as a result of this Element and its ongoing refinement.

Circulation Element

Circulation includes those systems that move people, materials, goods or services (e.g., water, sewer, jet fuel lines, petroleum products, energy, etc.) by any means.

Multiple hazards could impact the Circulation Element by imposing design constraints on roadways, overpasses, and bridges.

Housing Element

Policy decisions of the Seismic Safety Element reflect directly on the Land Use Element and in turn influence various aspects of housing. These policies will manifest themselves in design, location and/or placement of structures, construction codes, and certain safety feature requirements (e.g., automatic electrical cutoff, gas purging systems or fire warning devices). Modification of existing building and construction and grading codes may also be necessary.

Open Space and Conservation Element

The Seismic Safety Element will interface in a positive manner with the Open Space and Conservation Element. Implementation of these policies will increase the amount of open space available, its quality and accessibility.

Noise Element

The Seismic Safety Element supports the reduction of noise levels in residential areas by providing policies concerning upgraded construction standards in hazardous areas.

Scenic Highways Element

The Seismic Safety Element will delineate high hazard zones which may preclude normal development and may therefore offer increased opportunities for scenic highways. Although there is always the danger of a natural catastrophe in these zones, specific design criteria to mitigate the hazards can be included with the highway program.

Public Safety Element

The Seismic Safety Element has a strong relationship with the Public Safety Element. This Element will provide further guidance and assistance for the implementation of the Seismic Safety Element's policies of reducing loss of lives, injuries and damage to property. The Public Safety Element, utilizing many of the concepts from the Seismic Safety Element will propel those concepts into subject areas beyond just geologic hazards. Areas of potential focus include hazards caused by fire, crime and flooding.

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Prepared by
Planning and Development
Services Department
September, 1977

RESOLUTION NO. 4739

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF ORANGE ADOPTING THE SEISMIC SAFETY ELEMENT AS PART OF THE GENERAL PLAN FOR THE CITY OF ORANGE.

WHEREAS, Section 65302f of the California Government Code requires a Seismic Safety Element as part of the comprehensive General Plan for any California city; and

WHEREAS, said Element shall consist of an identification and appraisal of seismic hazards such as susceptibility to surface ruptures from faulting, to ground shaking, to ground failure, or to effects of seismically induced waves such as tsunamis and seiches; and

WHEREAS, the Seismic Safety Element shall also include an appraisal of mudslides, landslides, and slope stability as necessary geologic hazards that must be considered simultaneously with other hazards such as possible surface rupture from faulting, ground shaking, ground failure and seismically induced waves; and

WHEREAS, the Element was prepared with the assistance of and review by other departments; planning agencies; officials; public utilities; civic, educational, professional and other organizations; and citizens, to ensure maximum coordination; and

WHEREAS, the Seismic Safety Element was prepared in compliance with State law and fulfills the requirements of Section 65320(f) of the State Government Code, and can be used as a guide for future plans and programs in the City of Orange; and

WHEREAS, the work on the Seismic Safety Element has been divided into two parts, the first part is the actual Element, the second part is the technical report which provides more detailed discussions and the data base in support of the Element itself; and

WHEREAS, the City of Orange is, seismically speaking, in a fortunate position since the potential hazards identified in this Element, such as ground shaking, ground failure, seiches and expansive soils can be controlled once they are identified and prudently prepared engineering and construction plans can mitigate potential hazards and reduce or eliminate the possible risk involved; and

WHEREAS, the City Council has accepted the findings of the Environmental Review Board to prepare Negative Declaration 403.

NOW, THEREFORE, BE IT RESOLVED that the City Council of the City of Orange adopt the Seismic Safety Element as part of the Comprehensive General Plan for the City of Orange, and hereby instructs the staff to execute implementation measures outlined in the Element.

ADOPTED this 28th day of February, 1978.

ROBERT D. HOYT

MAYOR OF THE CITY OF ORANGE

ATTEST:

CHARLOTTE M.JOHNSTON ,CMC

CITY CLERK OF THE CITY OF ORANGE

I hereby certify that the foregoing resolution was duly and regularly adopted by the City Council of the City of Orange at a regular meeting thereof held on the 28th day of February, 1978, by the following vote:

AYES:	COUNCILMEN:	BARRERA, SMITH, HOYT, BEAM
NOES:	COUNCILMEN:	NONE
ABSTAINED:	COUNCILMAN:	PEREZ
ABSENT:	COUNCILMEN:	NONE

CHARLOTTE M. JOHNSON, CMC

CITY CLERK OF THE CITY OF ORANGE